REMARKS/ARGUMENTS

Reconsideration is respectfully requested.

Claims 1-9 are pending before this amendment. By the present amendment, claims 1-8 are amended. No new matter has been added.

Claims 1, 2 and 5 stand objected to under 35 U.S.C. §112, ¶2 as being indefinite. In response, the applicants have amended claims 1, 2, and 5 to further clarify aspects of the present invention in accordance with the examiner's suggestions. Further, the applicants respectfully submit that the phrase "moved in a layer 2 (or 3)" is not vague and sufficiently describes the limitations of the present invention. Specifically, the applicants submit that when a mobile node (MN) moves in a layer 2 or layer 3, it means that the MN is transitioning from one access point (AP) to another AP in the case of layer 2 and from one access router (AR) to another AR in the case of layer 3. The terms "layer 2" and "layer 3" correspond to layers of the OSI model commonly known in the art.

Layer 2 represents a data link layer while layer 3 represents a network layer. When a MN transitions from one AP to a new AP, the MN is considered to be moving within layer 2 of the OSI model. That is, layer 2 of the OSI model corresponds to an AP level in a wireless environment. Likewise, when a MN moves from an AR to a new AR, the MN is considered to be moving within layer 3 of the OSI model. That is, layer 3 of the OSI model corresponds to an AR level in a wireless environment.

Therefore, since the present invention deals with movement of a MN from one AP to a new AP and from an AR to a new AR, the applicants respectfully submit that reciting that the MN moves "in a layer 2 (or 3)" sufficiently describes how the MN is

moving within the wireless environment. Further, the applicants respectfully submit that one having ordinary skill in the art would understand that a MN moving in layer 2 represents a MN transitioning from one AP to another AP and when a MN is moving in layer 3 that the MN is transitioning from one AR to another AR.

Accordingly, the applicants respectfully request withdrawal of the outstanding rejections under 35 U.S.C. 112 since the claims have been amended to correct the minor informalities contained therein and also sufficiently describe aspects of the present invention as noted above.

Claims 1-9 stand rejected under 35 U.S.C. §103(a) as being obvious over U.S. Publication No. 2003/0104814 (Gwon) in view of U.S. Patent No. 6,930,988 (Koodli). The "et al." suffix is omitted in a reference name.

The applicants respectfully **disagree.**

The present invention is directed to access router (AR) based IPv6 fast handover method. A mobile node (MN) is a mobile device that connects to a network. As a MN moves between different areas, connection to a network may be interrupted due to the change in location and therefore a handover process must occur. Specifically, as a MN moves from an access point (AP) to a new AP, a MN moves within the Layer 2 of the OSI model, i.e., the data link layer. The APs are a part of a subnet under the control of an access router (AR). An AR is a Layer 3 device, i.e., the network layer. If a MN moves between an AP under control of a first AR to an AP under the control of a new AR, a layer 3 handover must occur in addition to a layer 2 handover.

To perform such a layer 3 handover, numerous messages are needed and transmitted between the MN, the current AR, and the new AR. Such messages and

their relationship are illustrated in FIG. 2 of the present invention. Mechanisms for trying to increase the speed of the handover process have been suggested such as using handover expectation information based on layer 2 actions and using a bi-directional tunnel based on the expectation information. However, obtaining expectation information of the new network area prior to moving to the new network area is difficult.

According to an embodiment of the present invention, a MN upon completion of a layer 2 handover process, supplies a modified Router Solicitation (RS) message directly to a new AR. In response, the new AR generates a Care of Address (CoA) for the new MN and transmits a modified Router Advertisement (RA) message directly to the MN for a fast layer 3 handover.

More specifically, a MN 40 transmits a Reassociation.request 111 to a new AP 33 belonging to a new AR 22 (present invention FIG. 3). Upon receipt of the Reassociation.request at the new AP 33, the new AP 33 responds with a Reassociation.reply 113 to complete a layer 2 handover process (specification page 10, lines 24-33). After completion of the layer 2 handover process, the MN 40 supplies an unsolicited modified RS message directly to the new AR 22 and occurs earlier than any other operation of the MN 40 (specification page 11, lines 7-11). Based on the received modified RS message, the new AR 22 determines if there is layer 3 movement of the MN 40 (specification page 11, lines 12-16). Based on the determination results, two cases may result.

In the first case, the MN 40 has been deemed as a new MN in the network controlled by the new AR 22. As a result, the new AR 22 generates a CoA and performs a Duplicate Address Detection (DAD) at the new AR 22 (specification page 11, lines 22-

23). After the generation of the CoA and performing the DAD, the CoA is packaged with the modified RA and transmitted directly from the new AR 22 to the MN 40 so that the MN 40 can use the generated CoA as its network interface address (specification page 12, lines 11-25). After this, the MN 40 can perform a binding update by using the new CoA without an additional DAD process (specification page 12, lines 26-26; FIG. 3).

In the second case, the new AR 22 determines that the MN 40 is only performing a layer 2 handover and is not requiring a layer 3 handover process. As a result, there is no need for the formation of the CoA and the MN 40 does not send out the modified RS message. That is, the MN 40 is determined as not making any layer 3 movement and accordingly, no additional updating other than the layer 2 handover information is required by the MN 40. To clarify these and other aspects of the present invention, claims 1-8 have been amended to more clearly reflect the subject matter disclosed in the specification. No new matter has been added to the claims.

The examiner asserts (Office Action page 3) that Gwon teaches steps a) - c) and step e) of claim 1. However, Gwon is directed to a different method of decreasing latency for a handover process. Specifically, Gwon discloses two schemes for minimizing latency associated with a layer 3 handover (Gwon [0047]). Gwon discloses a Pre-L2 (layer 2) handoff Mobile Initiated Tunneling handoff (Pre-MIT) and a Post-L2 handoff Mobile Initiated Tunneling (Post-MIT) (Gwon [0047]). Although the citations primarily relied on by the examiner discuss the Pre-MIT process, the more applicable aspects of Gwon come from the Post-MIT process since the present invention deals with the layer 3 handover process **after** the completion of a layer 2 handover as recited in amended claim 1. Therefore, although the examiner specifically cites steps of the

Pre-MIT process, which requires that a layer 2 handover has **not** yet been completed (Gwon [0049]), the present discussion will focus on the Post-MIT process since it is concerned with a layer 3 handover process **after** completion of a layer 2 handover (Gwon [0063]).

Unlike the present invention, which teaches a method of securing a CoA for a MN 40 without the need for numerous messages associated with the conventional method of performing a layer 3 handover, Gwon discloses a method for forming a tunnel between an old foreign agent (oFA) and a new foreign agent (nFA). Gwon specifically states that the protocols disclosed in Gown are substantially different from the conventional methods in that according to the conventional method, the protocols are implemented between a MN and nearby FAs, while in Gwon the same protocols are implemented between a FA and a neighboring FA (Gwon [0058]). That is, Gwon is concerned with the establishment of communication between two FAs, i.e., ARs when applied to IPv6. This is completely different from the present invention, which describes a method of a MN 40 communicating directly with a new AR 22 (present invention FIG. 3).

Gwon explicitly describes a Post-MIT process for mobile IPv6 in paragraphs [0077-0080] and FIGS. 8a-8b. According to the Post-MIT process for mobile IPv6 disclosed in Gwon, after completing a L2 handover process, the MN prepares a Mobile Handoff Initiation Message HI(m) that is transmitted to the new access router (nAR) (Gwon [0078]). The nAR then transmit a Target Handoff Initiation Message HI(t) to the original access router oAR (Gwon [0078]). The oAR returns a Handoff Acknowledgement Message HACK to the nAR (Gwon [0078]). Finally, the nAR forwards

the HACK to the MN (Gwon [0080]). Accordingly, a tunnel is created between **the nAR and the oAR**. After the MN receives the HACK, the MN will perform the standard Mobile IPv6 registration process with the nAR (Gwon [0080]). That is, after the Post-MIT process according to Gwon, a mobile IP registration process occurs, which allows a CoA to be registered (Gwon [0043]). More simply put, the Post-MIT process of Gwon does not in any way teach how a MN receives a CoA, but rather describes a method to create a tunnel between two access routers that a mobile node is moving between in order to decrease any latency in a layer 3 handover process.

The differences between the presently claimed invention and Gwon is further exemplified by examining FIGs. 2-3 of the present invention and FIG. 8b of Gwon. In FIG. 2 of the present invention, the messages used in a conventional layer 3 handover process are illustrated including a Handover Initiate (HI) message and a HACK message (present invention FIG. 2). According to the Post-MIT process of Gwon illustrated in FIG. 8b, it is clear how the HI(t), HI(m), and HACK signals conform to the conventional layer 3 handover process. That is, Gwon's Post-MIT process is very similar to the conventional art disclosed in the present invention. In contradistinction, the present invention in FIG. 3 illustrates that the need for the HI and HACK are no longer needed since the MN 40 supplies an unsolicited modified RS message directly to the new AR 22 upon which the new AR 22 supplies a modified RA directly back to the MN 40. This is very different from Gwon that teaches messages transferred between two access routers, not between a MN and a new AR.

Therefore, in no way does Gwon teach steps a) - c) and step e) of the present invention since Gwon does not teach -- **a new access router (AR)** receiving a modified

Router Solicitation (RS) message **directly** from **the** mobile node (MN)--, --detecting **layer 3** moved on of the mobile node **(MN)** **at** the **new** access router **(AR)**--, --**the new access router (AR)** generating a new Care of Address (CoA)--, and --transmitting a modified Router Advertisement (RA) message, which corresponds to the modified RS message transmitted from the mobile node **(MN)**, **directly** to the mobile node **(MN)** **from** the **new** access router **(AR)**--. More generally, Gwon does not disclose a mobile node MN communicating directly with a new access router AR to obtain a new CoA as in amended claim 1.

The examiner further relies on Koodli as teaching step d) of amended claim 1. More specifically, the examiner asserts that Koodli teaches --performing Duplicate Address Detection (DAD) **at** the... access router **(AR)**--. However, Koodli only teaches DAD being performed at the mobile node. In col. 1, lines 35-42 of Koodli cited by the examiner, Koodli explicitly states (emphasis added):

> "In any event, **the mobile node** typically ensures the uniqueness of the IP address **by performing Duplicate Address Detection (DAD)**, and router discovery procedures."

This is further reinforced in col. 4, lines 36-38 where Koodli states that in one embodiment "the mobile node performs a duplicate address detection (DAD) to determine another address." In addition, the examiner relies on FIG. 3 of Koodli for teaching the DAD of the access router, however, FIG. 3 illustrates a flow diagram for process 300 of a mobile node 108 shown in FIG. 1 (Koodli col. 7, lines 22-24). Therefore, in no way can Koodli teach --performing...DAD at the...access router-- since Koodli **only** discloses performing DAD at the mobile node which the present invention explicitly prevents.

Therefore, neither Gwon nor Koodli, whether considered individually or in combination, teach or suggest all of the limitations of amended claim 1. Accordingly, the applicants respectfully request withdrawal of the rejection and earnestly solicit an indication of allowable subject matter with respect to claim 1.

As to claims 2-9, the applicants respectfully submit that these claims are allowable at least since they depend from independent claim 1, which is now considered to be in condition for allowance for the reasons set forth above. Withdrawal of the rejections with respect to claims 2-9 is respectfully requested.

For the reasons set forth above, the applicants respectfully submit that claims 1-9, pending in this application, are in condition for allowance over the cited references. Accordingly, the applicants respectfully request reconsideration and withdrawal of the outstanding rejections and earnestly solicit an indication of allowable subject matter.

This amendment is considered to be responsive to all points raised in the office action. Should the examiner have any remaining questions or concerns, the examiner is encouraged to contact the undersigned attorney by telephone to expeditiously resolve such concerns.

Respectfully submitted,

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